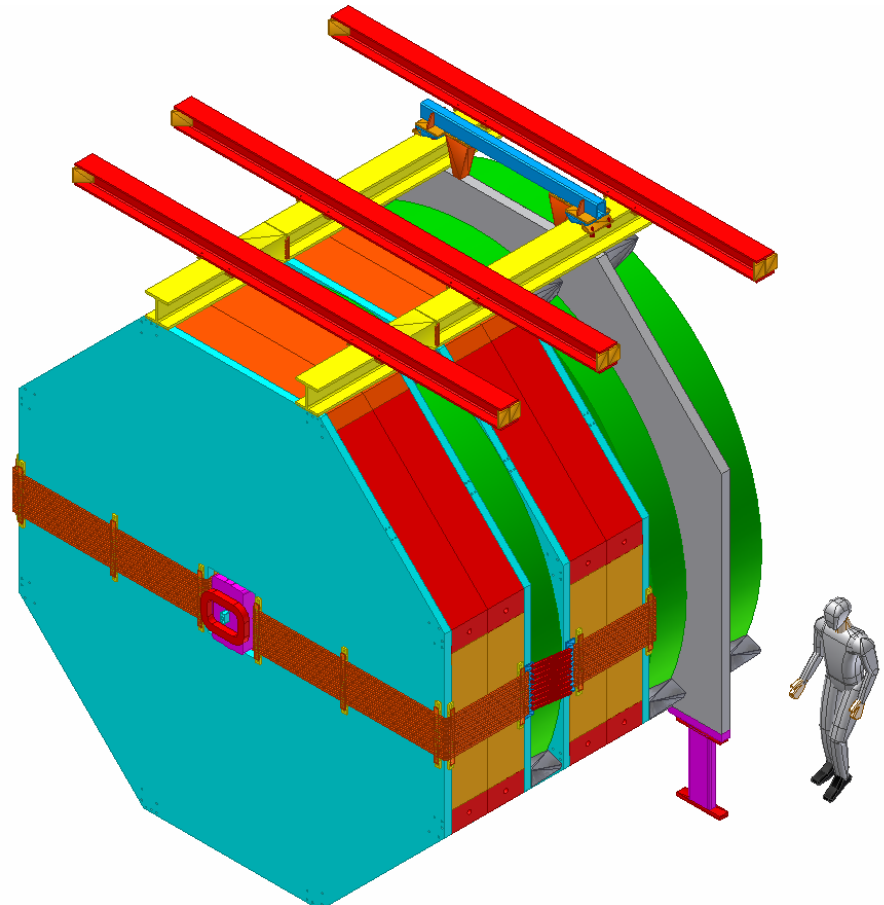




# BTeV Muon (WBS 1.5)

Will Johns ~ Vanderbilt University



## ■ Illinois

- Mats Selen
- Jim Wiss
- Doris Kim
- Mike Haney
- Vaidas Simaitas

### Legend:

Engineer  
Faculty  
PostDoc  
Technical

## ■ Puerto Rico

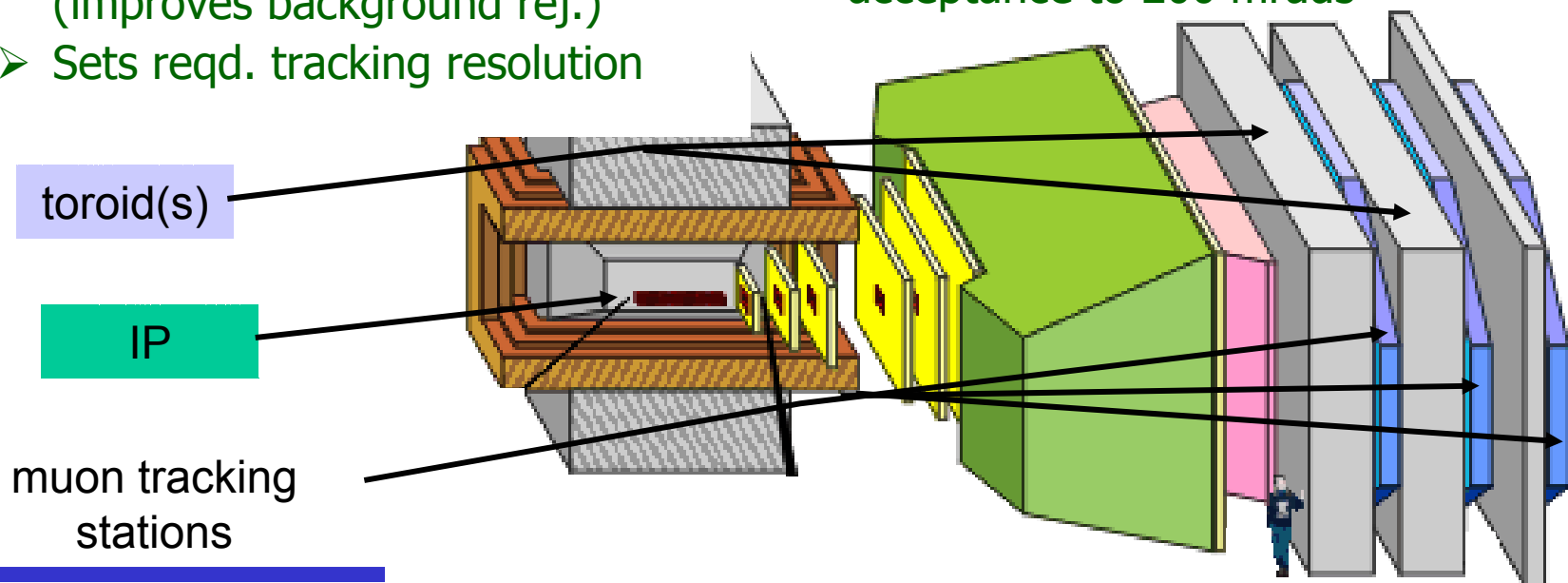
- Angel Lopez
- Hector Mendez
- Eduardo Ramirez
- Zhong Chao Li
- Aldo Acosta

## ■ Vanderbilt

- Will Johns
- Paul Sheldon
- Med Webster
- Eric Vaandering
- John Fellenstein

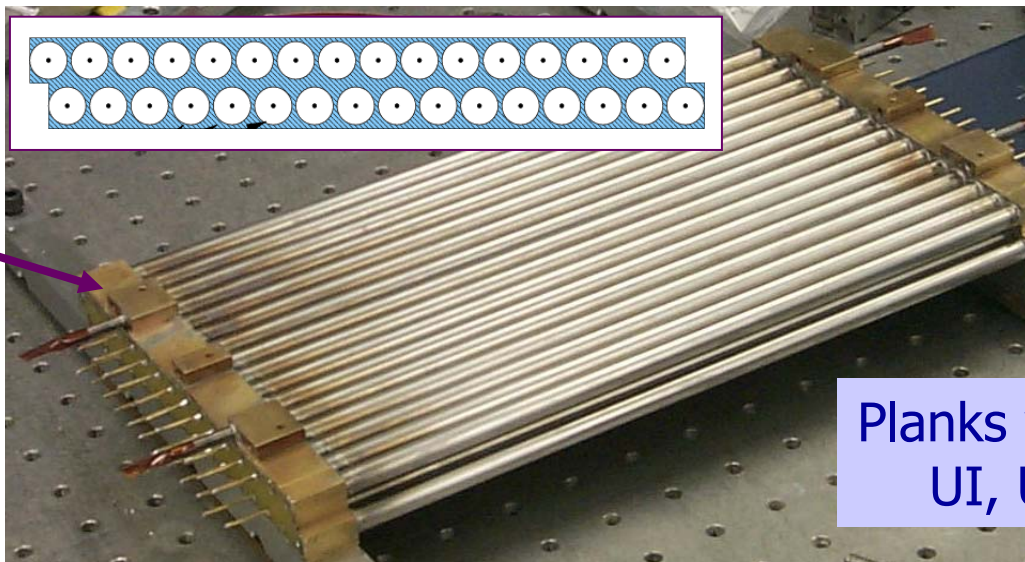


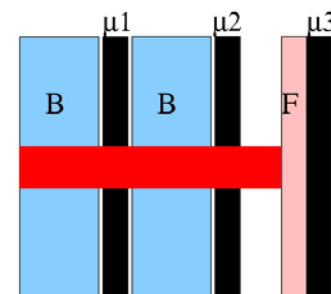
- Provides Muon ID and Trigger
  - Trigger & ID for interesting physics states
  - Check/debug pixel trigger
- Fine-Grained tracking + toroids
  - Stand-alone mom./mass trig.
  - Momentum “confirmation” (improves background rej.)
  - Sets reqd. tracking resolution
- Other design goals/constraints:
  - Min. pattern recognition confusion
  - Minimize occupancy
  - Distribute occupancy uniformly
  - Minimize max. drift time
  - Robust, high-rate detector element
  - Size of hall limits wide-angle acceptance to 200 mrad





- Basic Building Block: Proportional Tube “Planks”
  - 3/8” diameter Stainless steel tubes (0.01” walls)
  - “picket fence” design
  - 30 $\mu$  (diameter) gold-plated tungsten wire
  - Brass gas manifolds at each end (RF shielding important!)
  - Front-end electronics: use Penn ASDQ chips, modified CDF COT card
  - Likely to use 85% Ar - 15% CO<sub>2</sub> (no CF<sub>4</sub>... more on this later)

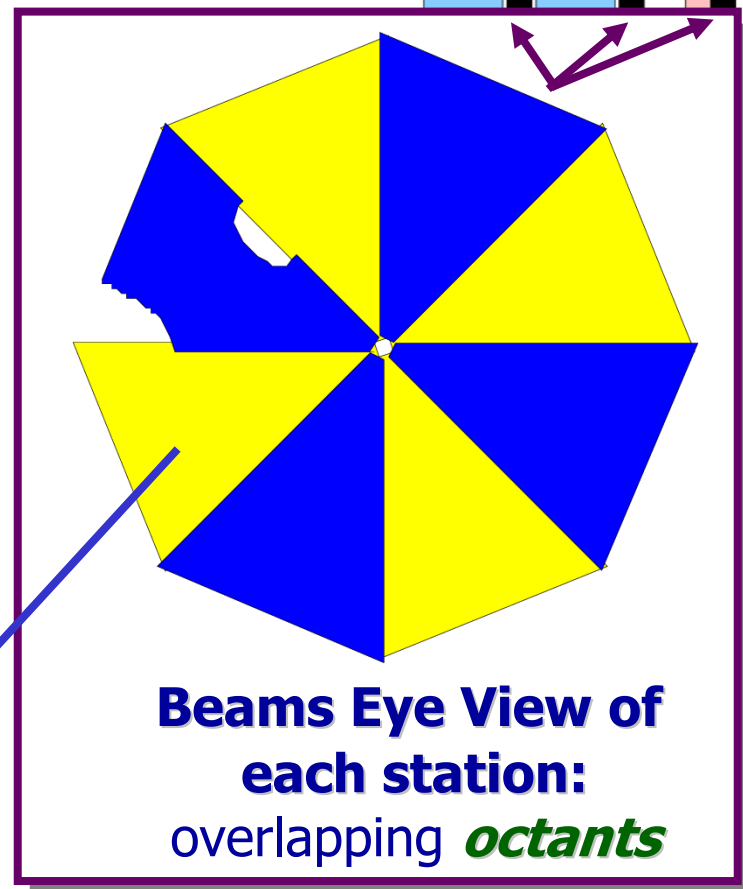
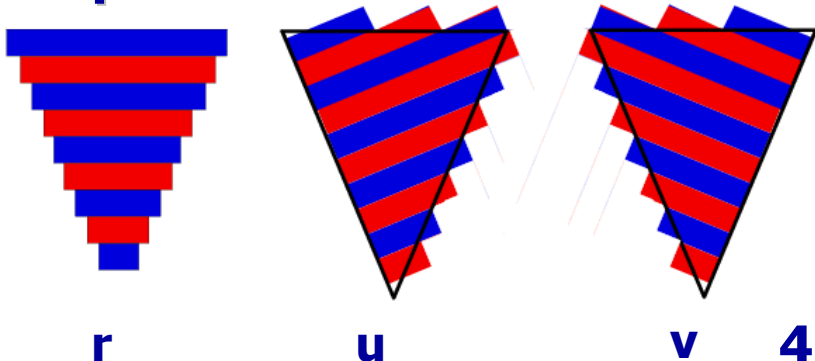




Meets design goals/constraints:

- Min. pattern recognition confusion
- Reduce occupancy
- Distribute occupancy uniformly
- Minimize max. drift time
- Robust, high-rate detector element
- Stand-alone momentum/mass trigger
- Momentum "confirmation" (improves background rejection)
- Meets reqd. tracking resolution ( $< 2\text{mm}$ )

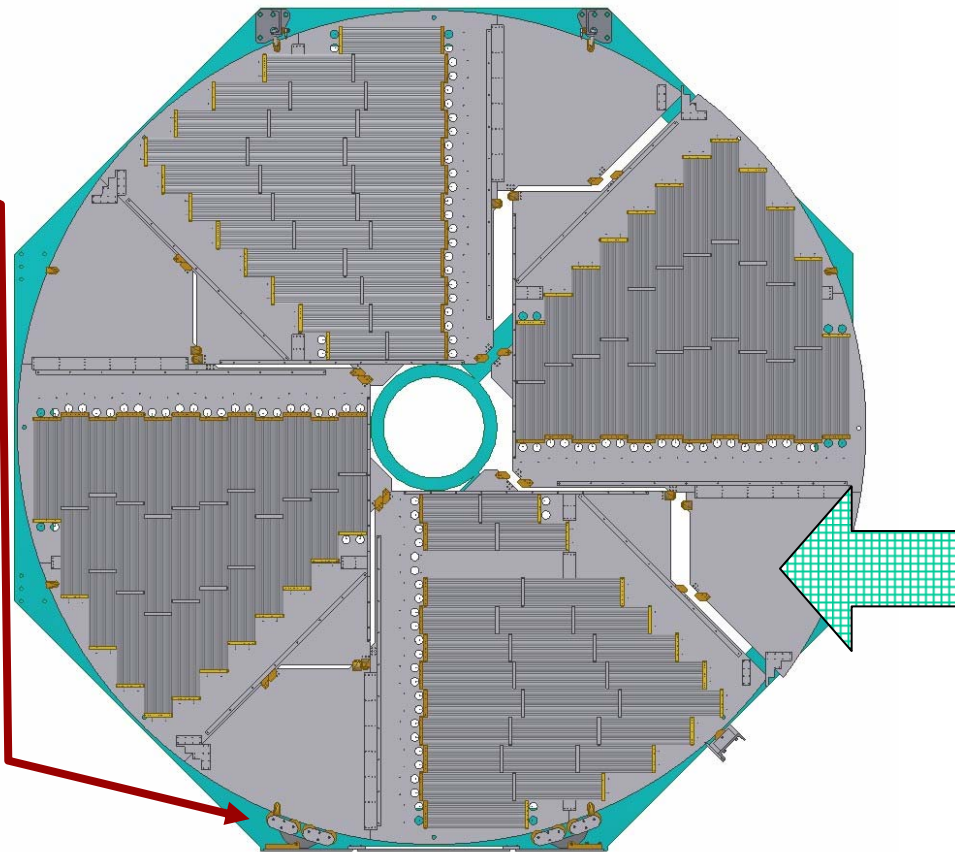
**12 planks "cover" each octant**



**stereo views provide  $\phi$  info.**

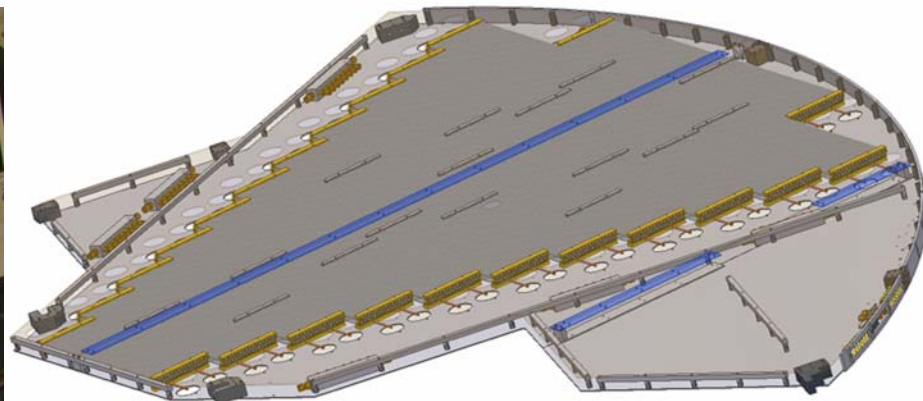
**4 views per station (r, u, v, r)**

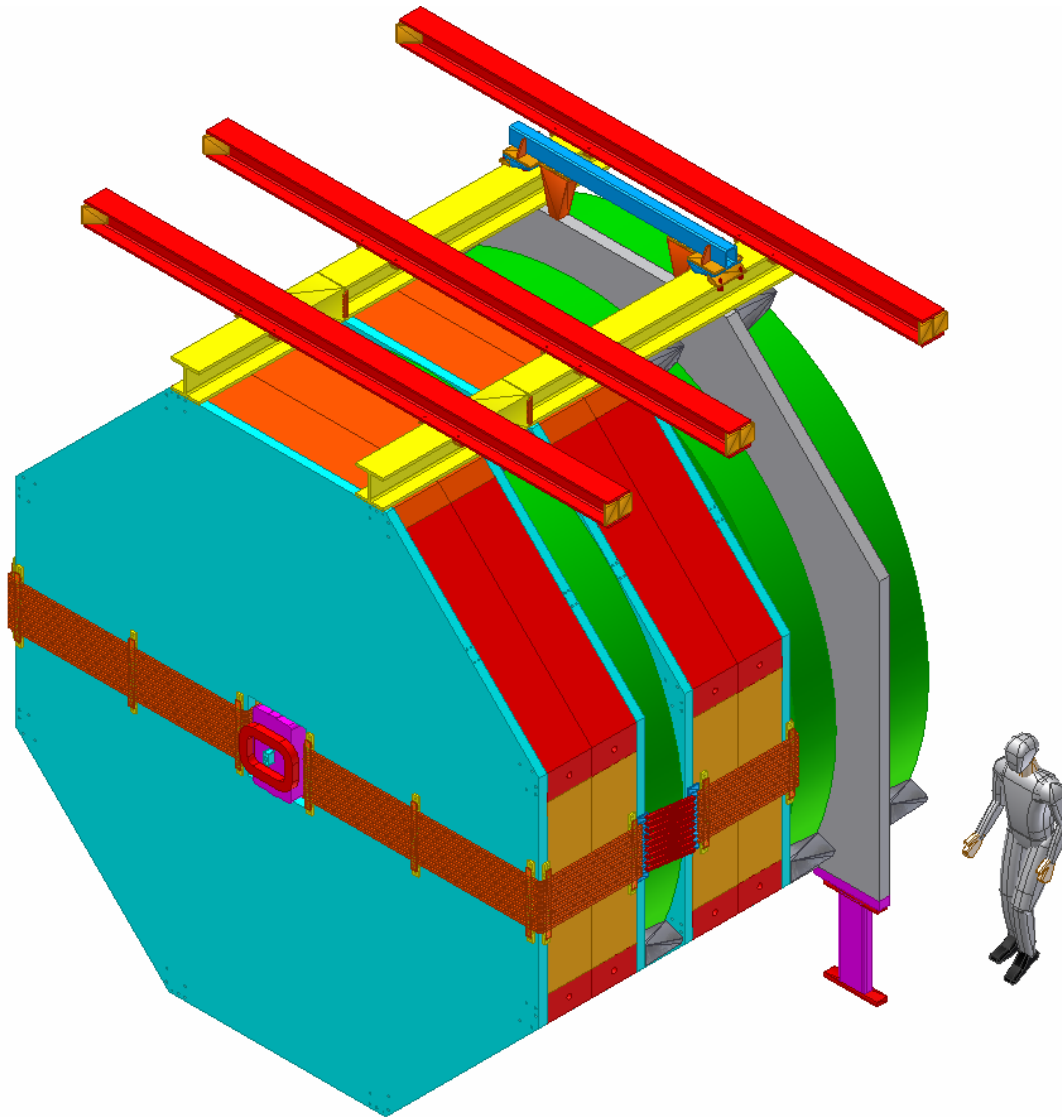
- 4 *octants* make a wheel, two wheels construct a view.
- Octants will be built at institutions and delivered to FNAL.
- "Vertical Lazy Susan" installation - rotate during installation on floor rollers
- Each wheel will then be hung vertically from overhead beams.
- This allows each view to be individually serviced: it will be possible to install and/or remove an octant during run.
- Each octant is installed in wide aisle horizontally.



U - stereo wheel plates.





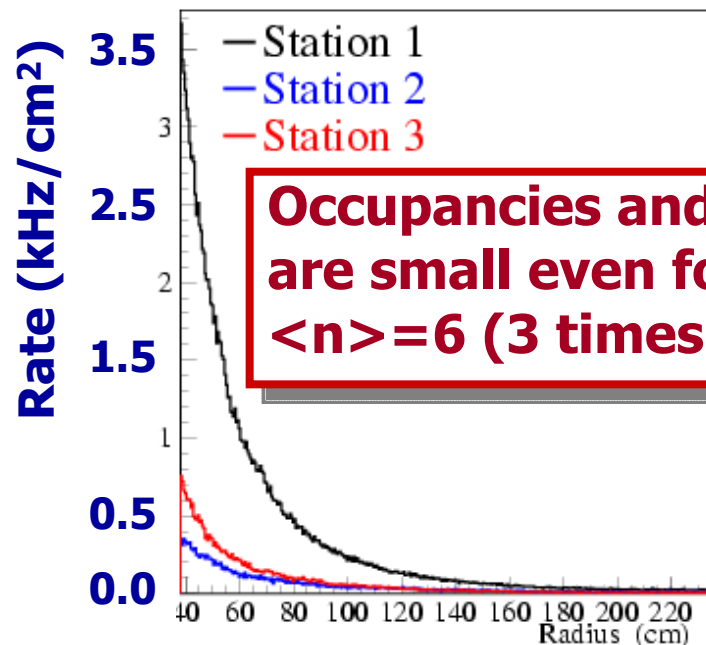
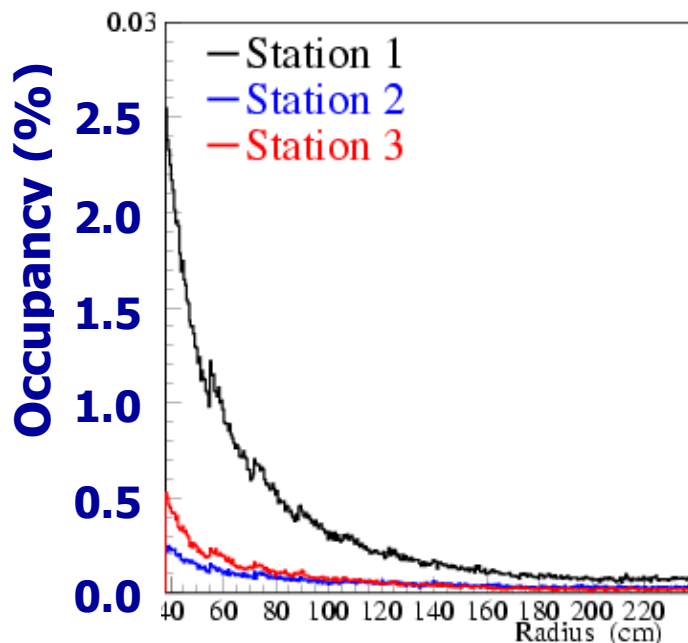


- The entire muon **system** can move with the toroid package since there are no floor connections.
- The wheels are supported from individual floor rollers during installation and then hung vertically from the overhead beams.



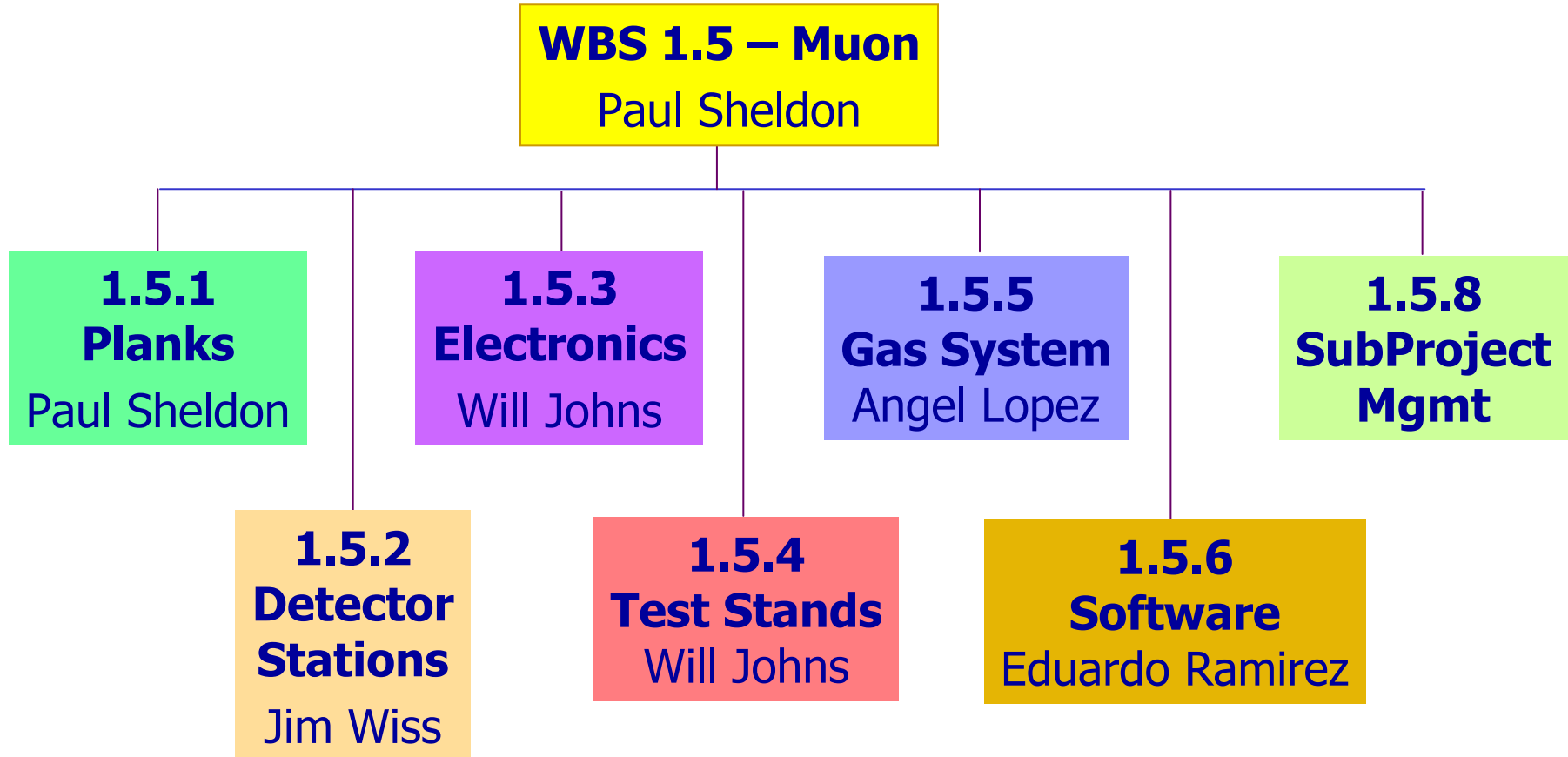
- Minimum bias events will be largest source of hits in detector
- Generated assuming an average of 2 interactions/crossing
  - OLD Luminosity of  $2 \times 10^{32}$  and 132 ns bunch spacing

What	Station 1	Station 2	Station 3	Total
avg. # of hits per crossing	42	8	9	54
avg. occupancy	0.34%	0.06%	0.07%	0.15%
max. channel occupancy	2.50%	0.24%	0.52%	
max. channel rate (kHz/cm <sup>2</sup> )	3.7	0.4	0.8	



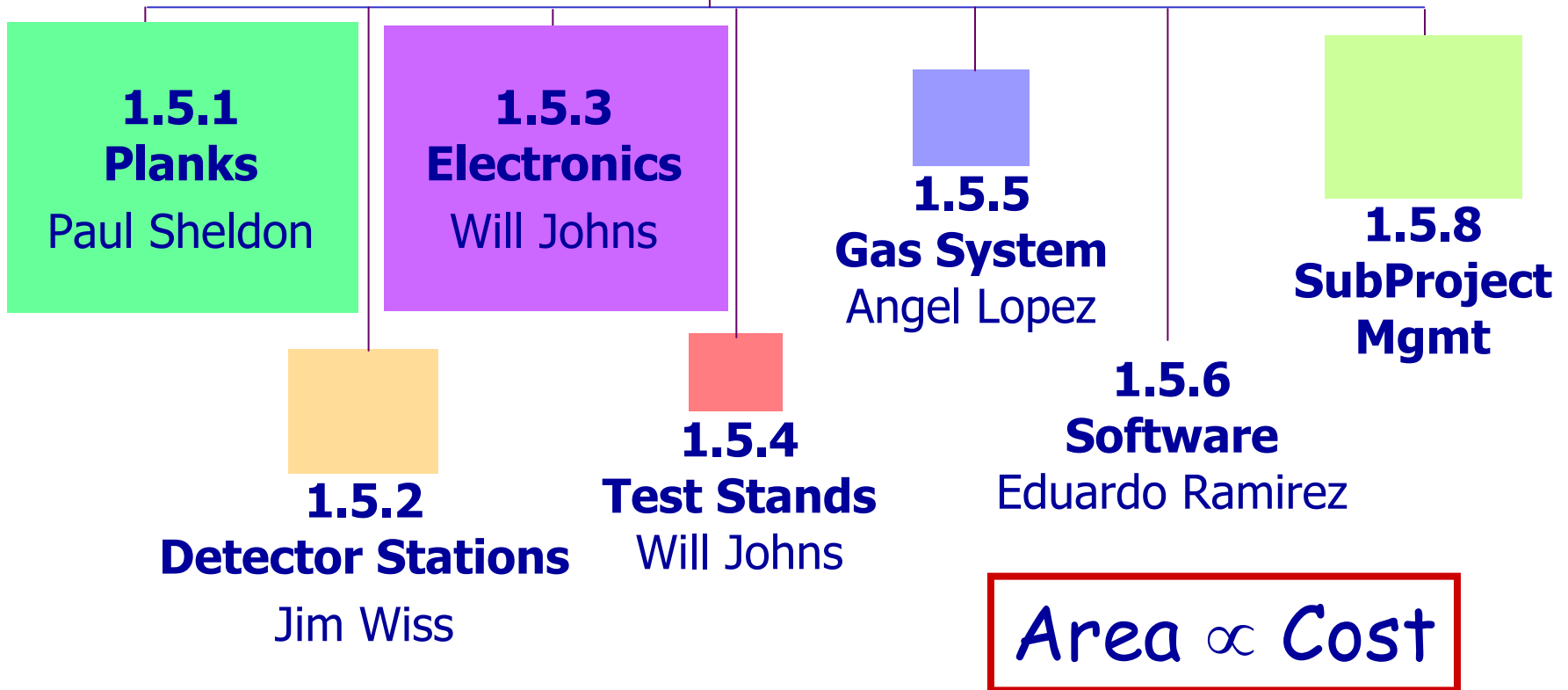
**Occupancies and rates are small even for 396ns  
<n>=6 (3 times larger)**

Base cost: \$3.81M (Material: \$2.93M, Labor: \$0.88M)



Base cost: \$3.81M (Material: \$2.93M, Labor: \$0.88M)

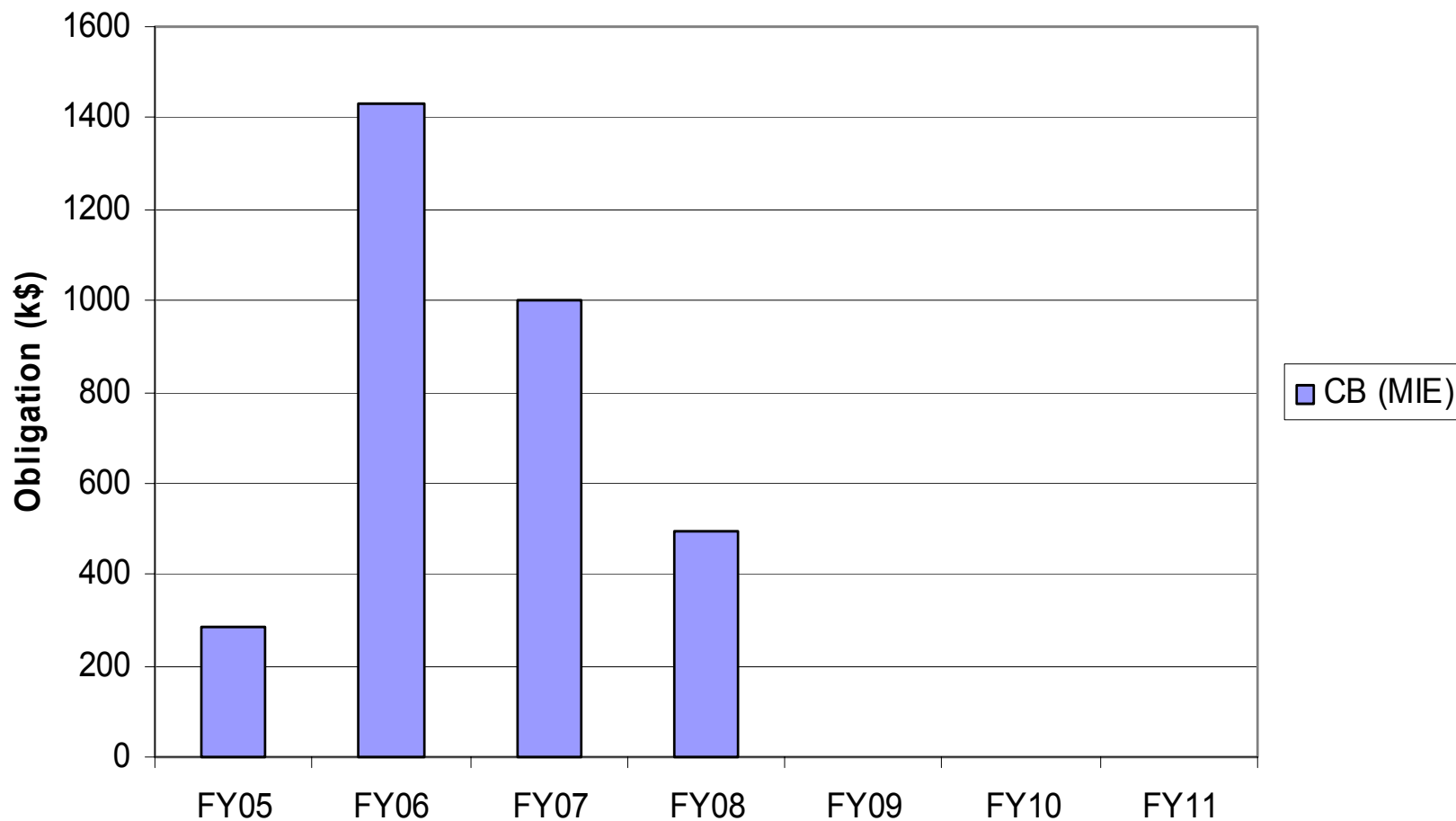
**WBS 1.5 – Muon**  
Paul Sheldon

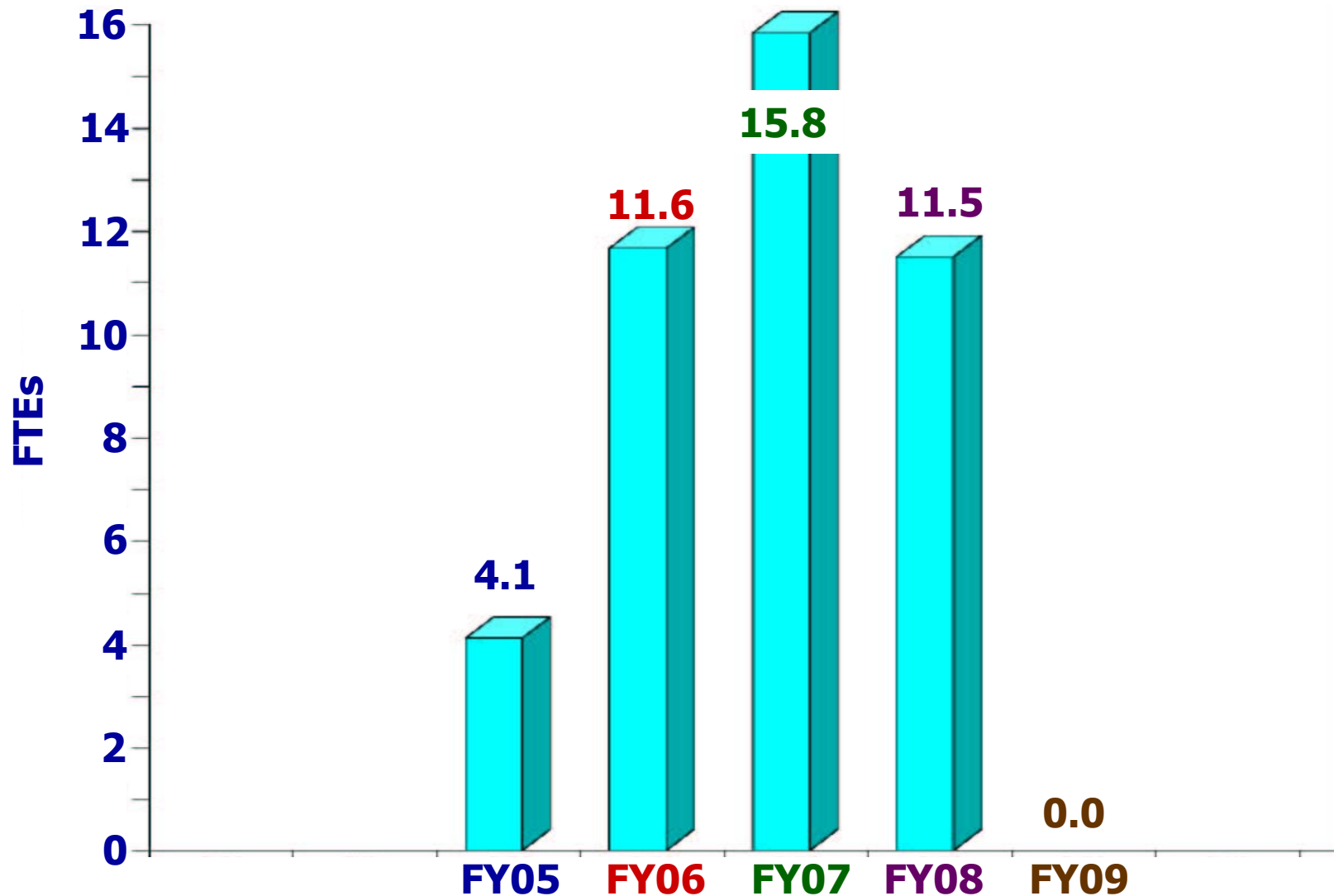


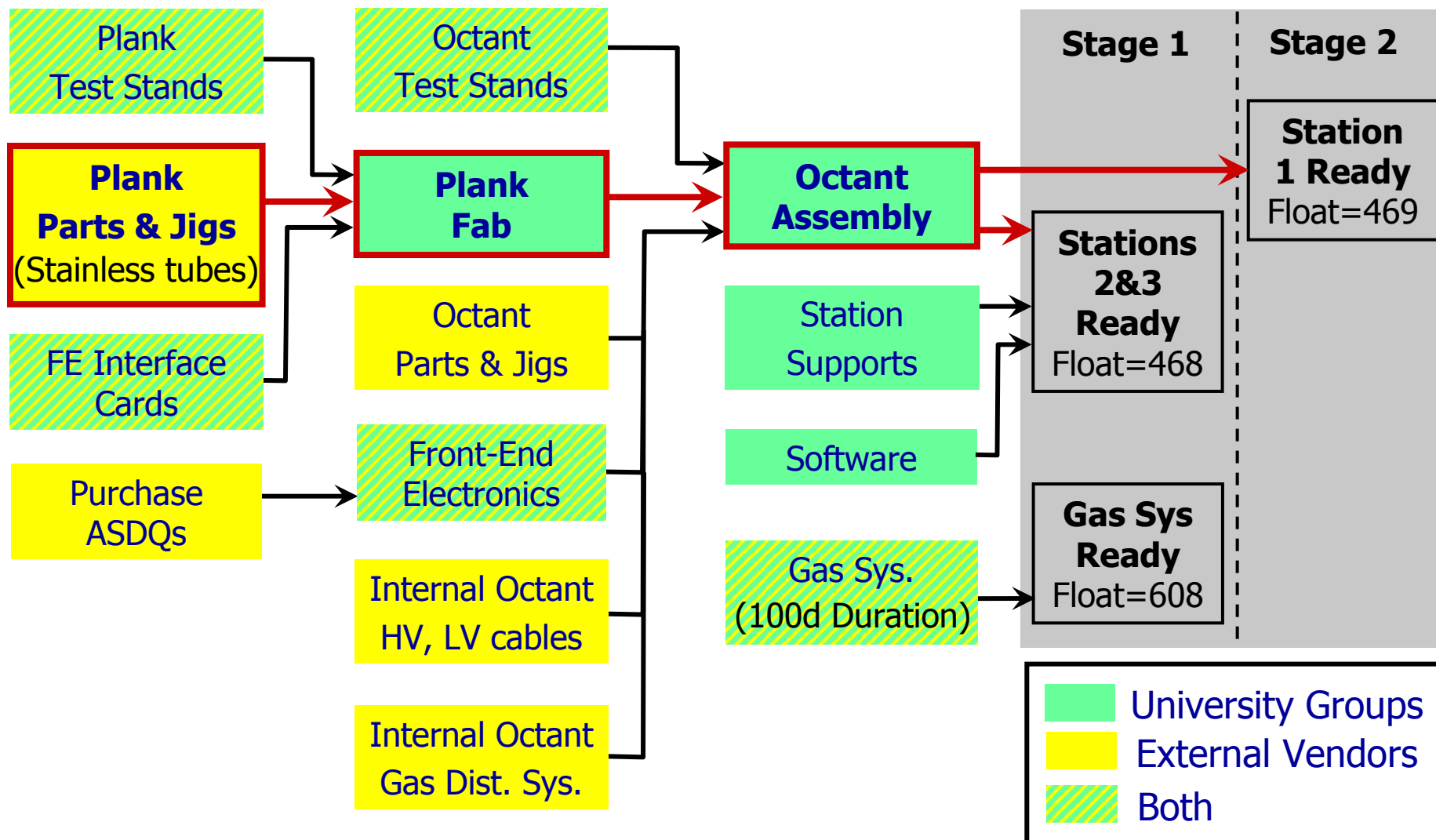
Activity ID	Activity Name	Base Cost (\$)	Material Contingency (%)	Labor Contingency (%)	Total FY05	Total FY06	Total FY07	Total FY08	Total FY09	Total FY10	Total FY05-10
<a href="#">1.5.1</a>	Muon Detector Planks	1,788,686	43	35	203,104	908,305	1,054,901	354,960	0	0	2,521,269
<a href="#">1.5.2</a>	Muon Detector Stations	350,771	40	35	63,436	246,290	136,397	41,013	0	0	487,136
<a href="#">1.5.3</a>	Muon Detector Electronics	1,341,849	41	17	40,118	885,865	415,335	510,614	0	0	1,851,933
<a href="#">1.5.4</a>	Muon Detector Test Stands	156,726	45	50	65,448	42,949	119,421	0	0	0	227,818
<a href="#">1.5.5</a>	Muon Detector Gas System	121,319	50	0	0	106,050	66,903	0	0	0	172,953
<a href="#">1.5.6</a>	Muon Detector Software	0	0	0	0	0	0	0	0	0	0
<a href="#">1.5.8</a>	Muon Detector Subproj Mgmt	669,276	24	24	115,275	238,882	238,882	238,882	0	0	831,920
1.5	file_15_092104	4,428,627	41	28	487,380	2,428,341	2,031,839	1,145,468	0	0	6,093,029

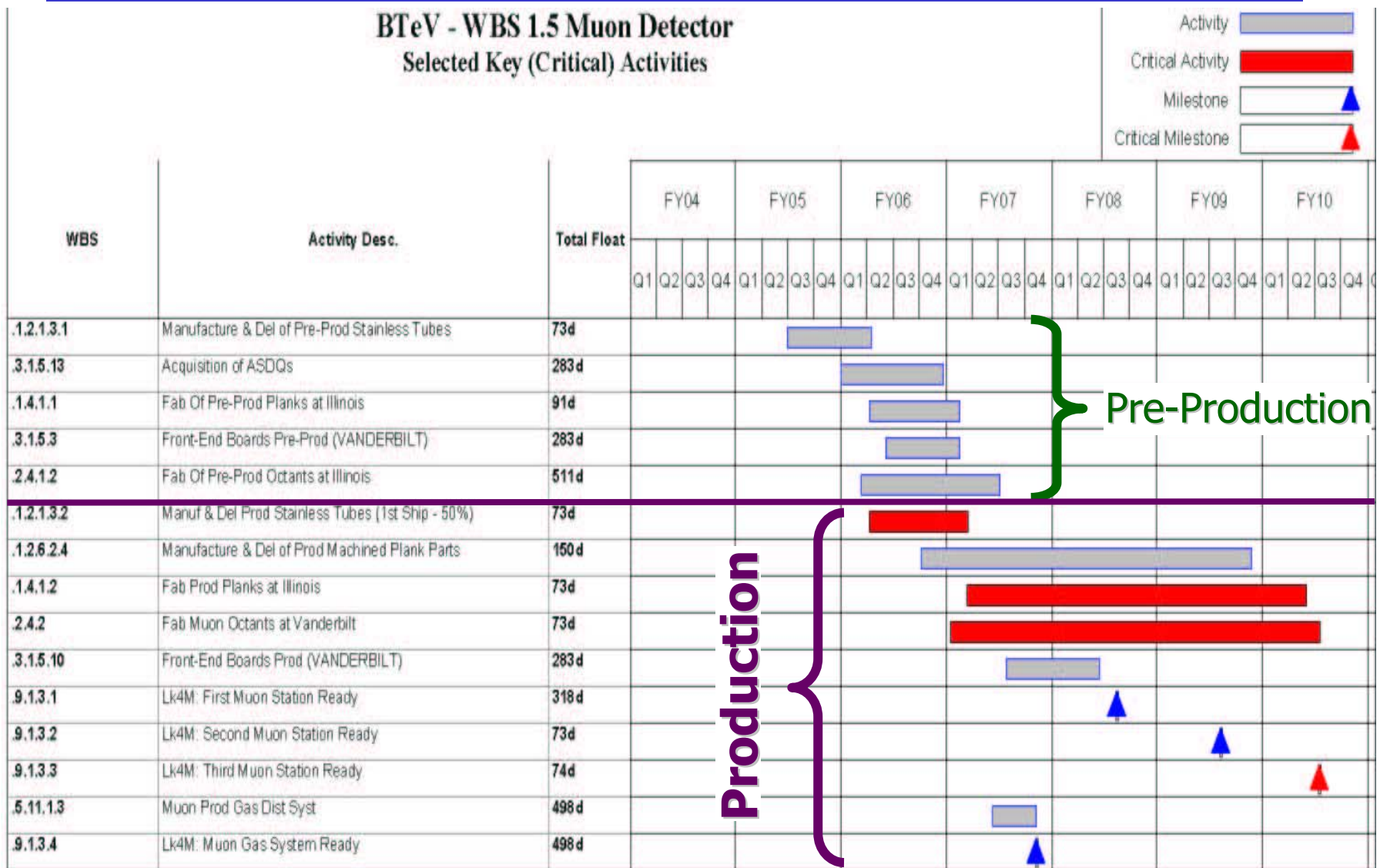


## WBS 1.5 Muon Detector M&S Obligation Profile











- The primary recommendation was that we hire a full-time quality assurance engineer for the duration of the project.
  - After discussing this with project management, it was decided that additional effort will be added to the project office to handle QA issues for BTeV. The muon project will hire a full-time technician to handle QA and project oversight.
  - We have added this technician to our WBS
- Actively pursue forward funding.
  - Vanderbilt has verbally agreed to provide \$1M in forward funding. MOU is in preperation.

# The End

The next two slides are required

- These should be terms that are BTeV jargon or really unusual technical terms. If you use a glossary at the end, indicate its presence clearly in a box on slide 3, so reviewers will know that it is there for them to peek at during the talk.



